Frequently Asked Questions about the Elkhorn Slough Sea Otter Research

Q. What is the Elkhorn Slough sea otter research project?

As part of a new project taking place in Elkhorn Slough, near Moss Landing, California, scientists hope to compile new data to support the recovery of **the southern sea otter** (*Enhydra lutris nereis*), a federally threatened species under the Endangered Species Act. This partnership of federal, state and local institutions is seeking **to increase our understanding of estuary habitat use by sea otters** — and to help inform the conservation and restoration of suitable habitat and water quality conditions at Elkhorn Slough.

As southern sea otters continue their recovery and expansion into southern and northern reaches of the California coast, they will encounter estuary habitats. But scientists are really not sure how sea otters will respond and thrive in estuary environments, and how their recovery will affect estuary food webs.

For the time being, Elkhorn Slough is our best example in California of sea otters using estuarine habitats — which have different environmental factors than say, kelp forests and other habitats along the coast. So using a variety of established study methods — radio tracking, veterinary exams, genetic analysis, diet observations — this collaborative group of scientists hopes to uncover new knowledge about this population of California's iconic sea otters — a population that hasn't been extensively studied for 15 years.

Q. Why study otters in estuaries?

Estuaries are unique, rich coastal habitat types. Worldwide, they are considered the most altered ecosystems on earth, because they are typically affected by agriculture, harbors, aquaculture, and power plants.

Elkhorn Slough hosts characteristic estuarine habitats such as salt marshes and mudflats, and supports hundreds of species of animals. Yet it has also been strongly affected by human activities, in particular by agriculture, which has led to some of the highest nutrient concentrations ever recorded for an estuary and to extensive habitat loss due to diking and draining.

Over the past decade, the otter population in Elkhorn Slough has grown dramatically. Initially, the population consisted mostly of males living in the harbor area. Now, there is a very high density of females with pups living in the middle of the estuary.

These animals appear to be benefitting from estuarine habitats, staying warm by sunning themselves on salt marshes, and catching abundant estuarine prey such as crabs and clams in much shallower waters than on the open coast. However, they may also be threatened by human alterations of the estuary, such as pollution and habitat loss.

This study will help resource managers and the public to better understand how otters use estuaries – both the values and the threats. The results will inform conservation and restoration decisions and policy for estuaries, and build public understanding of the need for such measures.

Otters historically were present in estuaries all along this coast — for instance Spanish explorers documented thousands of otters in San Francisco Bay. Gradually the recovering otter population will re-colonize other estuaries along the coast, and this research will help lay the groundwork for understanding how otters will interact not only with Elkhorn Slough, but with San Francisco Bay and other estuarine habitats.

Q. Who is conducting the research?

The research is being led by a partnership of the U.S. Geological Survey (USGS), University of California, Santa Cruz (UC Santa Cruz), California Department of Fish and Wildlife (CDFW), the Monterey Bay Aquarium, and the Elkhorn Slough National Estuarine Research Reserve (ESNERR), with assistance from other partners. The research is being funded by the State Coastal Conservancy of California via California's voluntary income tax check-off, and will include an outreach component to provide marine science education materials to local communities.

Q. Under whose authority is the sea otter research being conducted?

The work is authorized under a scientific research permit issued by the U.S. Fish and Wildlife Service's Division of Management Authority in Washington, D.C. The U.S. Fish and Wildlife Service (USFWS) is responsible for the recovery and management of the southern sea otter, and is the authorizing agency for research permits concerning many threatened and endangered species.

The permit authorizes the research partnership to capture, handle and release sea otters for the Elkhorn Slough project, as well as a suite of other ongoing sea otter research projects along the California coast. Projects at Elkhorn Slough and elsewhere will provide important data to inform and update the progress of the USFWS recovery plan for the southern sea otter (http://www.fws.gov/ventura/species_information/so_sea_otter/ssorecplan.pdf).

The research also has permissions from ESNERR, and various state and local offices.

Q. What is the goal of the project?

The specific goal is to determine how sea otters are using estuarine habitats and prey resources, understand their role in the estuarine food web, and to quantify and understand the effects of human-caused stressors — such as contaminants or nutrient inputs — on sea otters in Elkhorn Slough.

The ultimate goal of this project is to support the recovery of the southern sea otter in California, by informing conservation and restoration efforts to provide suitable estuarine habitat and water quality conditions at Elkhorn Slough — a habitat commonly used by sea otters.

The ESNERR and its partners are already spearheading projects in the estuary to conserve and restore habitat and to improve water quality. These projects could be designed to explicitly incorporate sea otter needs — for instance, improving salt marsh habitat for resting and channel habitat for foraging. Additionally, water quality regulations are currently being developed for Elkhorn Slough and its source tributaries.

Currently, too little is known about estuarine habitat use by otters to allow for design and implementation of restoration and regulatory strategies that take the needs of sea otters into account. This project initiates a conservation research program focused on Elkhorn Slough sea otters, and aims to deliver the scientific data needed by Elkhorn Slough resource stewards and to inform policy for the region.

Q. What will the Elkhorn Slough research project entail?

The sea otter research effort has several components:

Sea Otter Health Exams and Tagging: In September 2013, biologists and veterinarians will capture 20 sea otters in Elkhorn Slough, perform physical exams, take biopsies and surgically implant a VHF radio transmitter for tracking purposes. Veterinarians will measure health parameters including weight, body condition, blood diagnostics and tooth condition. Biopsies include a small tooth for age-determination, whiskers for chemical analysis, and blood for RNA gene marker analysis (see below). A small VHF radio transmitter/temperature recorder (approximately the size of an egg) also will be internally placed in each animal by veterinarians. The radio transmitter will allow scientists to follow sea otters throughout the Slough (and outside into Monterey Bay, should the otters leave the Slough) and record their use of different types of habitat, and will help scientists assess their health, reproduction and behavior.

Sea Otter "Energy Budget" Diet Study: Biologists and technicians will spend several years observing the feeding behavior of the 20 radio-tagged sea otters, as well as other sea otters living in Elkhorn Slough. For each feeding dive, observers record GPS location, diving times, surface times, and hunting success. For each successful dive, observers will record prey type, number of prey items, and estimated prey size. This data set will help scientists understand how much energy sea otters are spending to hunt for food and whether the food they find provides them enough calories to sustain their energy levels. This Calories-in/Calories-out calculation is the "energy budget" — an important measure in understanding whether a region's food web can support top-level predators like sea otters.

Molecular Biology Studies (proposed but not funded): Whisker biopsies will be saved for a future phase of the project using "stable isotope" analysis to further analyze the diet composition of individual sea otters, since whiskers can offer hints of a sea otter's recent diet history. Blood samples will be used in a future phase of the project, analyzing blood for "RNA markers" that can indicate whether an individual sea otter has been exposed to pollutants and contaminants. This remarkable, high-tech method can be coordinated with future samples of water quality and contaminant analysis in shellfish and other sea otter prey species in the Slough, to connect the dots between sea otter health and environmental factors in the Slough.

Q. Why do you have to internally implant the VHF radio tag?

Marine mammals like whales, dolphins and seals have very smooth skin, short fur, or dorsal fins which allow the convenient attachment of radio or GPS tracking devices. Sea otters, however, depend on their dense fur for warmth, and any impediment to this fur can seriously damage a sea otter's ability to keep warm. Thus, any type of tracking device must be internally placed.

Veterinarians from the Monterey Bay Aquarium, CDFW and UC Davis are renowned worldwide for their expertise in wildlife health. Their veterinary and surgical protocols have been in place for many years and the same veterinarians are responsible for sea otter health exams on research projects throughout California, as well as on northern sea otters in Washington, British Columbia, and Alaska.

Wildlife scientists only conduct surgery on wildlife when necessary. Internal tags are the best currently available technology to help scientists understand sea otter behavior and their health and habitat needs. Radio tagging of sea otters in various parts of California is providing valuable data on their biology, and it has been a worthy investment towards the ultimate goal of preserving this species into the future.

Q. I love sea otters. How can I help with the Elkhorn Slough project?

There are several excellent ways to help the Elkhorn Slough project:

Helping Researchers:
If you see researchers working at the veterinary station or taking part in a sea otter capture, please stay clear of the area, and please do not approach. Disturbing these processes can cause harm and additional stress to the sea otters and seriously impede the research.

If you see a technician observing sea otters through a telescope, please wait until they are at a stopping point to ask questions. We are happy to educate and share our passion for marine science, but we apologize in advance for the fact that frequent interruptions make it hard to stay focused on a wild otter!

If at any time you find a sea otter that is dead or dying in Elkhorn Slough or anywhere in California, visit the USGS California Sea Otter Stranding Network website (http://www.werc.usgs.gov/seaotterstranding) and report the stranding. A scientist will respond to the incident.

Exploring Sea Otter Science:
As part of the Elkhorn Slough project, research partners led by the Monterey Bay Aquarium and other institutions will host public outreach events in the Monterey Bay area during Sea Otter Awareness Week, September 22-28, 2013. This is your best opportunity to talk to marine science educators and learn about sea otters and the clues they offer about our nearshore ecosystem health — the same ecosystem that humans enjoy and depend on.

Local institutions will also be creating and updating sea otter and marine science education materials for use in classrooms. Stay tuned for ways to find these educational resources.

Support Sea Otter Science:
The State of California offers taxpayers an option to donate to California sea otter research when filing their annual California Resident Income Tax Return. The Fund supports government researchers working to understand what's threatening sea otters and to find ways to help them recover. When filling California income tax form 540, contributions in amounts $1 or greater can be made on line 410, labeled California Sea Otter Fund, under Voluntary Contributions. To learn more about the California Sea Otter Fund, visit http://www.seaotters.org/checkoff/.

Get Involved with Elkhorn Slough:
To learn more about the estuary and its inhabitants, including sea otters, visit the Elkhorn Slough Reserve (Visitor Center and trails open to the public Wednesday-Sunday). To become a citizen scientist or help with estuary stewardship or education, consider becoming a volunteer. To support conservation and restoration in the Elkhorn Slough watershed, join the Elkhorn Slough Foundation. More information about all these opportunities is at http://www.elkhornslough.org.

Public Affairs Contacts for the Elkhorn Slough Sea Otter Project

Angela Hains
Monterey Bay Aquarium
Public Relations Manager
ahains@mbayaq.org | 831-647-6804

Eric Laughlin
California Department of Fish and Wildlife
Public Information Officer
eric.laughlin@wildlife.ca.gov | 916-323-6286

Kerstin Wasson
Elkhorn Slough National Estuarine Research Reserve
Research Coordinator
kerstin.wasson@gmail.com | 831-728-2822 x310

Ben Young Landis
USGS Western Ecological Research Center
Science Communicator
blandis@usgs.gov | 916-616-9468

Stephanie Weagley
U.S. Fish and Wildlife Service
Public Affairs Specialist
stephanie_weagley@fws.gov | 805-512-6758

Learn more about California sea otter research at:
http://www.montereybayaquarium.org/cr/sorac.aspx
http://www.werc.usgs.gov/seaottercount
http://www.dfg.ca.gov/ospr/Science/marine-wildlife-vetcare/
http://www.vetmed.ucdavis.edu/owcn/